

PROCEEDINGS
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A NEW LONG-TAILED VOLE
(*MICROTUS LONGICAUDUS* (MERRIAM))
FROM UTAH

BY M. RAYMOND LEE AND STEPHEN D. DURRANT

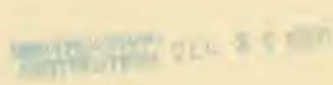
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The Henry Mountains located in Wayne and Garfield counties of south-central Utah, constitute a small range having 5 major peaks of which only 3 exceed 10,000 feet in elevation. The entire range is surrounded on all sides by low-lying desert. Thus, these mountains are effectively isolated from neighboring highlands and at their higher elevations form a montane island in a desert. Because of the inaccessibility of these mountains, few mammals had been obtained previously from there. When Durrant prepared his "Mammals of Utah, Taxonomy and Distribution" (Univ. Kansas Publs. Mus. Nat. Hist., 6: 371-375, 10 August 1952), he knew of no specimens of *Microtus longicaudus* from the Henry Mountains. During the past four years, we have collected these mountains intensively and have disclosed the occurrence there of the long-tailed vole. A study of these mice reveals that they merit sub-specific recognition.

All measurements are in millimeters. Capitalized color terms are after Ridgway (Color Standards and Color Nomenclature, Washington, D. C., 1912).

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***Microtus longicaudus incanus*, new subspecies**

Type: Adult male, skin and skull, number 14,286, Museum of Zoology, University of Utah; $\frac{1}{4}$ mile southeast of Burned Ridge, Mount Ellen, Henry Mountains, 10,300 feet, Garfield County, Utah; 10 September 1957, collected by M. Raymond Lee, original number 1512.

Range: Henry Mountains of Wayne and Garfield counties, Utah.

Diagnosis: Size: Small (see statistics); caudal index (ratio of length of tail to length of head and body) small (see statistics). Color: Light, dorsum and top of head near Light Ochraceous-Buff with slight admixture of dark hairs; sides, face and feet gray (gray of sides extends well onto back in majority of specimens); hairs of venter white-tipped, plumbeous basally. Skull: Small (see statistics); relatively smooth at all ages; nasals short and wide distally; interparietal long (anteroposteriorly) and nearly rectangular in shape; maxillary plate of orbit wide with straight or convex anterior margin; anterior opening of infraorbital foramen narrow.

Statistics: Analyses of the external and cranial characters of the type and adult topotypes and near topotypes from Burned Ridge, Eagle and Sawmill basin are:

CHARACTER	SEX	n	\bar{x}	\pm S.E.	S.D.	R
Total length	F	12	170.4	± 2.68	9.30	186-155
	M	5	172.6	± 3.74	8.38	182-162
Length of tail	F	12	53.1	$\pm .90$	3.12	58-49
	M	5	52.8	± 1.91	4.28	59-49
Length of hind foot	F	12	21.1	$\pm .36$	1.24	24-19
	M	5	21.4	$\pm .31$	.70	22-21
Length of ear	F	12	14.3	$\pm .25$	.87	15-13
	M	5	14.0	$\pm .32$	.71	15-13
Caudal index	F	12	.454	$\pm .011$	.039	.542-.398
	M	5	.441	$\pm .015$	.033	.480-.389
Condylbasilar length	F	9	24.93	$\pm .25$	.76	26.1-24.0
	M	3	25.5	$\pm .56$	.97	26.1-24.4
Palatilar length	F	12	13.54	$\pm .15$	.53	14.5-13.0
	M	5	13.62	$\pm .31$	.70	14.7-13.0
Length upper molar series	F	12	6.58	$\pm .06$	.21	6.8-6.3
	M	5	6.52	$\pm .13$	.30	7.1-6.3
Zygomatic breadth	F	11	14.92	$\pm .2$	.65	16.4-14.2
	M	5	15.06	$\pm .31$	.70	15.7-13.9
Width of bulla	F	9	5.84	$\pm .06$	.24	6.1-5.4
	M	3	6.2	$\pm .11$	.20	6.4-6.0

n = sample size
 $\bar{x} \pm$ = mean and standard error

S.D. = standard deviation
 R = extremes

In the majority of characters listed, the difference between males and females is insignificant.

Comparisons: Members of the subspecies *Microtus longicaudus incanus* are the grayest of any population within the species that has been studied. Specimens of *M. l. incanus* can be distinguished from topotypes of *M. l. latus* and *M. l. mordax* as follows: Size: Smaller; caudal index decidedly less (.450 as compared to .505 and .516). Color: Grayer. Skull: Less angular in adults, smaller; distal ends of nasals wider and more inflated; maxillary plate of orbit wider and with anterior border straight or convex as opposed to concave; tympanic bullae narrower and longer; anterior opening of infraorbital canal narrower; interparietal longer (anteroposteriorly) and more rectangular as opposed to pentagonal; foramen magnum smaller.

Compared with topotypes of *M. l. alticola* specimens of *M. l. incanus* show the following: Size: Larger; caudal index about equal. Color: Markedly grayer. Skull: Larger; distal ends of nasals wider; rostrum relatively shorter; tympanic bullae longer and more inflated; interparietal larger and more rectangular; interpterygoid space narrower; foramen magnum larger.

Remarks: Morphological studies reveal that *M. l. incanus* was derived from the same ancestral stock from which the *M. l. mordax*-*M. l. latus* group arose. Although distinctive, specimens of *M. l. incanus* are most closely allied to the long-tailed voles which inhabit the Aquarius Plateau to the west of the Henry Mountains. The Henry Mountains are separated from the Aquarius Plateau by approximately 20 miles of desert which, at its lowest point, extends downward to an elevation of approximately 5,800 feet. These voles were not found below 8,000 feet on either the Henry Mountains or the Aquarius Plateau and thus it is evident that these mammals are totally isolated on the Henry Mountains. Moreover, the extent and degree of their isolation is reflected in the considerable amount of differentiation which they have undergone.

The factors responsible for this isolation are not completely understood although it is generally known, that at this latitude, these voles require a montane type of vegetation in addition to rather mesic conditions. On the basis of the knowledge relative to past climatic conditions, we are able now to give an estimate of the minimal time of isolation of *Microtus longicaudus* on the Henry Mountains. Also, this knowledge enables us to explain how these voles became isolated on these mountains. Because of the colder climate during the Valdres glacial substage of the Wisconsin glacial period, the montane vegetation was known to have been depressed 2,500 feet in elevation. This is sufficient to bridge the now existing desert area between the Henry Mountains and the Aquarius Plateau. This occurred 10,000 to 11,000 years ago, and the voles would have had ready access during this time to both areas.

Antevs (American Antiquity, 20 (4): 326) has shown that since the Cary Maximum, climatic conditions in the Great Basin and contiguous areas have become in general progressively warmer and drier. During

the Anathermal approximately 8,500 years ago, the climate was similar to that of today. Approximately 4,000 to 7,500 years ago, or during the Altithermal, a maximum of aridity and warmth was attained which accentuated the desert conditions between the Henry Mountains and the western plateaus, and effectively destroyed the bridge of montane vegetation which previously had enabled these mammals to cross back and forth between these two areas. The climate during the Medithermal or that period succeeding the Altithermal, although fluctuating somewhat, was less arid than the latter. According to Antevs (*loc. cit.*), it appears unlikely, however, that the fluctuations toward cooler and more moist conditions during the Medithermal were of sufficient magnitude to re-establish a suitable habitat for these voles to enable them to bridge the area between the Henry Mountains and the plateaus to the west. In addition, there is little doubt but that these voles were even more effectively isolated during the Altithermal when the climate was considerably more arid than at present. From the foregoing, it seems justifiable to consider that during the past 8,500 to 9,000 years no gene exchange has occurred between the populations of *Microtus longicaudus* on the Henry Mountains and those on the plateaus to the west.

Specimens examined: Total, 26, distributed as follows: Garfield County: S end Sawmill Basin, Henry Mtns., 9,500 ft, 1; Sawmill Basin, 9,100 ft, 1; Burned Ridge, Mt. Ellen, 10,300 ft, 10; $\frac{1}{4}$ mi SE Burned Ridge, Mt. Ellen, 10,300 ft, 6; Eagle, E slope Mt. Ellen, 7,800 ft, 5; Straight Creek, E slope Mt. Pennell, 9,000 ft, 3.